

3. THE APPROACH

It is desirable that there be one unique format for data interchange so that interchangers will know that each time they receive a set of data, it will be in the same format as the last one they received.

It is assumed that each subscriber to the standard has two in-house computer procedures. One converts the subscribers database to the standard, the other converts the standard to the subscriber's database. A subscriber might also have other utility procedures to aid in the construction of translation tables and so forth. The standard therefore consists of:-

- (a) A common representation of the microwave coordination data representing the site, path and channel information.
- (b) A common format to represent description tables for equipment, antenna codes and so on in order to ease the task of code translation. Each subscriber is responsible for maintaining the necessary translation tables to convert to their own system.

With this operation in mind the approach taken in constructing this standard is based on the following criteria:-

- (a) The standard should be as common as possible to all potential users. This means that it should be as easy as possible for the various views of the data to be constructed from the standard and converted to the standard.
- (b) The standard description tables should be designed so that automation in the creation of the user's translation tables should be as cost effective as possible.
- (c) There is no need for data compression in the standard as it will occupy cheap storage media (presumably magnetic tape).
- (d) The format should be "sortable" as desirable by the target user (or by the source at the target user's request). This is the easiest way to accommodate the large variety of representations that the standard must address. For this reason much data is duplicated on each record in order to give a usable sort key to the most number of users.

4. DESCRIPTION TABLES

Description tables are necessary in a standard such as this. These tables contain such information as antenna codes, equipment codes, frequency plans, and operator/owner codes. They must be in a form that can be easily used by the receiving organization to construct the necessary translation tables for loading the database.

Each record in a particular description table must be unique with respect to the key item. For example, there may not be two antennas with the same key item or two frequency plans with the same code. The description tables must also be complete. That is, each key item in any path record must have been defined in the corresponding description table.

The description tables for the operators, antennas, equipments and frequency plans will be exchanged on tape. In addition, the recipient will require printed tables for state/province codes, load codes and status codes. These tables are not expected to change over time and may be encoded into the computer procedures used to convert the users database to and from the interchange standard.

5. THE STANDARD FORMAT

5.1 TAPE RECORDING FORMAT

The tape recording format can be left up to the requirements of the supplier and receiver of the tape. These considerations would include such details as whether the tape was ASCII or EBCDIC, labelled or unlabelled, nine track, the tapes' blocking, and so forth. This standard is concerned with the record contents, and it is assumed that the tape supplied will be readable by software on the target system.

The only constraint this standard imposes on the recording format is that all alphabetic characters be in upper case, since some systems distinguish between the two cases on input.

5.2 TAPE CONTENTS

The tape will consist of five files. Since the format of the data in each file is different, it is likely that each file will have a different record length and blocking factor.

The order of the files is as follows:-

Site Operator Descriptions

The data giving the descriptions of the site operating companies.

Antenna Descriptions

The reference data for the antennas used.

Equipment Descriptions

The reference data for the equipment codes used.

Frequency Plan Descriptions

The frequencies in each plan used in the descriptions of the Transmit Channel Groups.

Microwave Path Data

The data describing the path and site information being passed.

5.3 MICROWAVE PATH RECORD FORMAT

Each record represents one microwave path with information describing the sites, antennas, equipments as well as the transmit frequencies, loading and power on each end of the path. The record contains two halves with each half describing one of the two stations comprising the microwave path. There is no ordering for the two stations thus either station can be listed first in the record. If one or both stations uses multiple transmit powers, loadings, equipments or frequency plans then additional records are used to describe the communications between the stations. Figure 1 summarizes the data items in each record and these items are further described below.

The record is "formatted" (i.e. contains no machine dependent binary, in the sense of FORTRAN formatted I/O; it should be printable without translation). The records are fixed length. The record contains the following for each station:-

5.3.1 Call Sign

Length

8 characters

This is the FCC or DOC assigned station call sign. In the case where a station has not received a call sign yet, a "fictitious"

call sign may be assigned. A fictitious call sign is a unique series of non-blank characters starting with '?'. This designation is unique to the supplier of the data and must be maintained over subsequent exchanges.

5.3.2 Site Name

Length 11 characters

This can be anything meaningful to describe the site.

5.3.3 Site Province, State or Territory

Length 2 characters

The two character USPS abbreviation of the state or province.

5.3.4 Site Latitude

Length 6 characters

Six character representation to the second : ddmms, all zeros should be present explicitly, for example 490700.

5.3.5 Site Longitude

Length 7 characters

Seven character representation to the second : dddmms, all zeros should be present explicitly, for example 0770001.

5.3.6 Site Ground Height

Length 5 characters

Height above mean sea level in feet.

5.3.7 Site Operating Company

Length 8 characters

This is the key into the operator translation table for the company that operates the site.

5.3.8 Transmit Antenna

Length 8 characters

This is the key into the antenna translation table for the transmit antenna for the station.

FIGURE 1
MICROWAVE PATH RECORD FORMAT

Station 1	Call Sign	8
	Site Name	11
	Province/State	2
	Latitude	6
	Longitude	7
	Ground Height	5
	Operating Company	8
	Transmit Antenna	8
	Transmit Ant Height	4
	Transmit Ant Feed Loss	4
	Receive Antenna	8
	Receive Ant Height	4
	Receive Ant Feed Loss	4
	Diversity Antenna	8
	Diversity Ant Height	4
	Diversity Ant Feed Loss	4
	Transmit Power	4
	Transmit Equipment	8
	Equipment Stability	7
	Transmit Loading	11
	Transmit Frequency Plan	6
	Channel Polarization	13
	Channel Status	13
Station 2	Call Sign	8
	Site Name	11
	Province/State	2
	Latitude	6
	Longitude	7
	Ground Height	5
	Operating Company	8
	Transmit Antenna	8
	Transmit Ant Height	4
	Transmit Ant Feed Loss	4
	Receive Antenna	8
	Receive Ant Height	4
	Receive Ant Feed Loss	4
	Diversity Antenna	8
	Diversity Ant Height	4
	Diversity Ant Feed Loss	4
	Transmit Power	4
	Transmit Equipment	8
	Equipment Stability	7
	Transmit Loading	11
	Transmit Frequency Plan	6
	Channel Polarization	13
	Channel Status	13
	Date Last Altered	6

5.3.9 Transmit Antenna Height

Length

4 characters

The height above ground of the centreline of the transmit antenna for the station, in feet.

5.3.10 Transmit Antenna Feed System Loss

Length

4 characters

This is the feed system loss in dB to 1 decimal place, for the transmit antenna (e.g. 5.2 dB would be 05.2). Two digits are used as some power companies use feed losses of 15-20 dB to reduce potential interference.

5.3.11 Receive Antenna

Length

8 characters

Key item into the antenna translation tables for the receive antenna of the station. If a separate receive antenna is not used, that is, the transmit antenna is also used to receive, then this item will be blank.

5.3.12 Receive Antenna Height

Length

4 characters

Height above ground of the centreline of the receive antenna at the station if a separate receive antenna is used, else blank.

5.3.13 Receive Antenna Feed System Loss

Length

4 characters

Feed loss as described in 5.3.10:

5.3.14 Diversity Antenna

Length

8 characters

Key item into the antenna translation tables for the diversity antenna. blank if not used.

5.3.15 Diversity Antenna Height

Length

4 characters

Height above ground of the diversity antenna. Blank if no diversity antenna.

5.3.16 Diversity Antenna Feed System Loss

Length 4 characters

Antenna feed system loss as described in 5.3.10 or blank if the diversity antenna is blank.

5.3.17 Transmit Power

Length 4 characters

The output of the transmission equipment in dBm to 1 decimal point. For example 40.0 represents 40 dBm. Blank if the frequency plan is blank.

5.3.18 Transmit Equipment

Length 8 characters

This is the key into the equipment translation table for the equipment used at this end. Blank if the frequency plan is blank.

5.3.19 Equipment Stability

Length 7 characters

This is the equipment stability used in this group in percent of the carrier frequency, for example .005, note that the decimal point must appear, trailing zeros are not necessary. Blank if the frequency plan is blank.

5.3.20 Transmit Loading

Length 11 characters

This is the key item into the loading translation table, see Appendix C.

5.3.21 Transmit Frequency Plan

Length 6 characters

This is the code used to reference the frequency plan translation table. If the station is not transmitting this field will be blank. If both stations in the record are transmitting then both frequency plans must be in the same frequency band. Each frequency plan referenced in a microwave path record must have been defined in the frequency plan translation table.

5.3.22 Channel Polarization

Length 13 characters

Each character in this field describes the polarization of the corresponding frequency in the frequency plan. If a frequency in the plan is not used then the corresponding character in this field is blank. The possible polarizations and their meanings will be supplied by the sending organization in the form of a printed table, see Appendix A.

5.3.23 Channel Status

Length 13 characters

Each character in this field describes the channel status of the corresponding frequency in the frequency plan. If a frequency in the plan is not used then the corresponding character is blank. The possible channel status characters and their meanings will be supplied by the sending organization in the form of a printed table, see Appendix B.

5.3.24 Date Last Altered

The date the record was last altered. It is stored in International Standard Form (YYMMDD). This is an optional field and if not available should be blank.

5.4 SITE OPERATOR RECORD FORMAT

This section of the media contains the codes and interpretations for the operating companies referred to by the path records. The records will all be of fixed length consisting of:-

5.4.1 Operating Company Key

Length 8 characters

This is the key used to refer to the operating company for each site. It may be any eight alphanumeric characters.

5.4.2 Operating Company Name

Length 30 characters

The name of the operating company or institution.

5.4.3 Operating Company Address

Length 60 characters

The street address of the company or institution.

5.4.4 Operating Company City

Length 15 characters

The city of the company or institution.

5.4.5 Operating Company State, Province or Territory

Length 2 characters

The USPS code for the jurisdiction.

5.4.6 Operating Company Zip

Length 9 characters

The postal code for the operating company; alphanumeric.

5.4.7 Operating Company Coordination Contact

Length 30 characters

The name of the person or department to make contact with for coordination purposes.

5.4.8 Operating Company Phone Number

Length 13 characters

The telephone number including area code in the form (999)999-9999.

5.4.9 Operating Company Identification Number

Length 7 characters

This is an optional field that can be used to contain the FCC or DOC designated number referring to the operating company.

5.4.10 Protection Company Key

Length 8 characters

This is the key used to refer to the protection company for each site. It may be any eight alphanumeric characters.

5.5 ANTENNA DESCRIPTION RECORD FORMAT

This section of the media contains the description of the antennas used in the first section. The records are fixed length and contain the following:-

5.5.1 Antenna Key

Length 8 characters

This is the eight alphanumeric character key used in the microwave path records to refer to an antenna.

5.5.2 Antenna Manufacturer

Length 20 characters

The name of the company that manufactured the antenna.

5.5.3 Antenna Catalogue Number

Length 20 characters

This is the number of this antenna in the manufacturer's catalogue. If this is not a relevant description, it is the code most commonly used to unambiguously refer to the antenna.

5.5.4 Antenna FCC Designation

Length 6 characters

In cases where the antenna has an FCC designation this field appears in order to ease the process of translation and allow some automation of the process.

5.6 EQUIPMENT DESCRIPTION RECORD FORMAT

This section of the media contains the descriptions of the equipment codes used in the microwave path records. The records are in fixed format and contain the following:-

5.6.1 The Equipment Key

Length 8 characters

This is the eight character alphanumeric key used in the first section to refer to this equipment type.

5.6.2 The Equipment Manufacturer

Length 20 characters

This is the manufacturer of the equipment.

5.6.3 The Manufacturer's Catalogue Number

Length 20 characters

The code used in the manufacturer's catalogue to identify this equipment type. If this is not relevant, then this is the code most commonly used to unambiguously refer to this equipment type.

5.6.4 The FCC Equipment Designation

Length 6 characters

This is the FCC designation of this equipment type, if available, otherwise blank.

5.6.5 The Equipment Stability

Length 7 characters

This is the equipment stability in percent of the carrier frequency, with the decimal point. It must always be present.

5.7 FREQUENCY PLAN DESCRIPTIONS

Each frequency plan will appear on one record in the following format:-

5.7.1 The Frequency Plan Code

Length 6 characters

This is the plan code that appears in the Local Channel Group's description of the channel group using this plan.

5.7.2 Number of Frequencies in this Plan

Length 2 characters

This is the number of frequencies that appear on this record. It can be an integer from 1 to 13, right justified.

5.7.3 Frequencies in the Plan

Length 8 characters

There are up to 13 consecutive fields of these. Each one contains the frequency in integer kilohertz of the given frequency in the plan. The entire plan is stored on one record. All frequencies must be in the same frequency band.

APPENDIX A - CHANNEL POLARIZATION CHARACTERS

The channel polarization is one character, as follows:-

- H - Horizontal
- V - Vertical
- B - Both Horizontal and Vertical
- C - Circular Polarization
- ? - Unknown Polarization
- R - Linear Polarization, rotated 45°
clockwise, by right hand rule,
from vertical
- L - Linear Polarization, rotated 45°
counter-clockwise, by right hand
rule, from vertical

APPENDIX B - CHANNEL STATUS CHARACTERS

The channel status is a one character code to indicate its operational status.

- P - Planned Growth Frequency
- C - Prior-coordinated
- O - Operational
- R - Removed from Operation
This could be used to detect channels
to be deleted from the database
- ? - Status is unknown, but frequency is
present
- T - Temporary
- A - Applied for License
- B - Building Permit Granted

APPENDIX C - CHANNEL LOADINGS

Channel loadings are broken into two fields. The modulation type and the modifying quantifier. The modulation type and meaning of the quantifier is as follows:-

Modulation Type (6 characters)	Quantifier (5 Characters)
FDMFM	Number of Voice Frequency (VF) channels.
FDMSSB	Number of VF channels.
VIDFM	Peak deviation in MHz. Decimal point may be present.
VIDSSB	Peak deviation in MHz. Decimal point may be present.
DUV	Number of VF channels.
DAV	Number of VF channels.
ANALOG	This is general analog modulation. The quantifier is the number of VF channels.

For Digital Systems:

FSK	Frequency Shift Keying	Bit rate in Mbits/s.-Decimal point may be present or equi- valent number of voice channels.
APK	Amplitude Shift Keying	Same

PSK	Phase Shift Keying	Same
MSK	Minimum Shift Keying	Same
DMSK	Dual MSK	Same
QPSK	Quadrature Phase Shift Keying	Same
8PSK	8 Level PSk	Same
16PSK	16 Level PSk	Same
4 QAM	4 Level Quadrature Amplitude Modulation	Same
8 QAM	8 Level QAM	Same
16 QAM	16 Level QAM	Same
32 QAM	32 Level QAM	Same
64 QAM	64 Level QAM	Same
QPRS3	Quadrature Partial Response System, Level 3	Same
QPRS7	QPRS Level 7	Same
QPRS9	QPRS Level 9	Same
QPRS25	QPRS Level 25	Same
QPRS49	QPRS Level 49	Same
UNKNOWN	Unknown Digital	Same

APPENDIX D

DESCRIBING ONE WAY PATHS

If a microwave path is transmitting from only one station then the following rules apply.

DATA ITEM	TRANSMIT SIDE	RECEIVE SIDE
Transmit Antenna Information	Supplied	Blank
Receive Antenna Information	Blank	Supplied
Diversity Antenna Information	Blank	Optional
Power, Equipment, Stability, Loading	Supplied	Blank
Frequency Plan, Polarization, Status	Supplied	Blank